Engin 103 March 26, 2009 back to e-syllabus	Topics: CW6 Circuit Analysis with LabVIEW III Logbook questions

Engineering 103 –UMass Boston

CW 6

(In-Class-Work 6)

Circuit Analysis with LabVIEW III: Follow Instructions in today's class notes, produce a VI that solves a circuit with one battery and six resistors, producing four outputs: total current I, and voltages V2, V4, and V6.

In each team, students working together at a computer numbered between 1 and 10 will submit LabVIEW LLB file cw6_XX_a.llb, students working at a computer numbered between 11 and 20 will submit LabVIEW LLB file cw6_XX_b.llb, to the *files* folder in the server. Replace XX by 01 if team 1, etc.

Include your names within the files.

*Remember that this is an individual work (turn it in, as instructed, with your name and date). Home-works and class-works count 20% toward the course grade. Class-works are done in class.

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Circuit Analysis with LabVIEW III (See also the link with the same name in the e-syllabus)

Example: a VI that solves a simple electrical circuit with one battery and six resistors

Developing a Virtual Instrument consists of the following steps:
1) Define the problem you want to solve, specify what will be the inputs and the outputs.
Inputs are battery voltage V; resistors R1 to R6; outputs are voltages across R2 (V2); R4 (V4); R6 (V6); and current through R1 (I)
Draw the circuit for the front panel
Enter six Numeric Controls for the six inputs; and four Numeric Indicators for the four outputs

2) Determine the equations or operations needed to produce the outputs from the inputs
Equations are given in the link on e-syllabus "Circuit Analysis with LabVIEW III"

$$I = \frac{V}{R1 + \dfrac{R2 \cdot \left\{ R3 + \left[\dfrac{R4 \cdot (R5 + R6)}{R4 + R5 + R6} \right] \right\}}{R2 + \left\{ R3 + \left[\dfrac{R4 \cdot (R5 + R6)}{R4 + R5 + R6} \right] \right\}}} \quad (1)$$

$$V2 = V - I \cdot R1 \quad (2)$$

$$V4 = V2 - \left(I - \frac{V2}{R2} \right) \cdot R3 \quad (3)$$

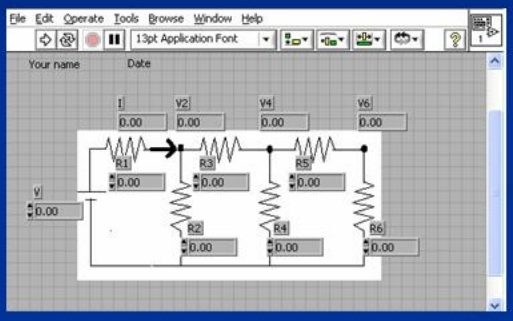
$$V6 = V4 - \left[\left(I - \frac{V2}{R2} \right) - \frac{V4}{R4} \right] \cdot R5 \quad (4)$$

3) Implement the controls and indicators and graphs in the Control Panel and the operations in the Block Diagram
Observe the terminals for connecting "Divide" (what is connected to the upper terminal of "Divide" is divided by what is connected to the lower terminal) or "Subtract" operations

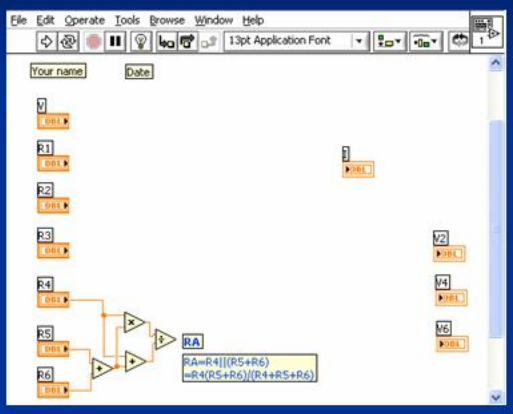
4) Fix any error and implement modifications as needed

5) Test the final results against expected theoretical values.

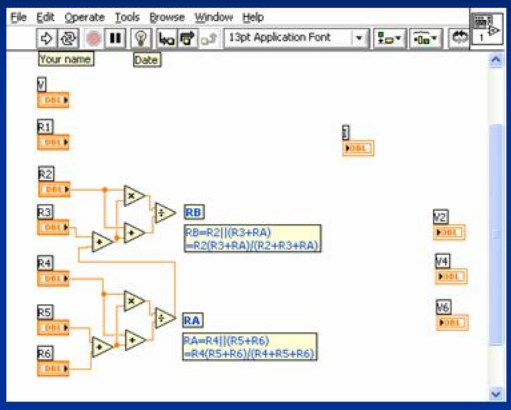
Circuit 3:
Step 1:



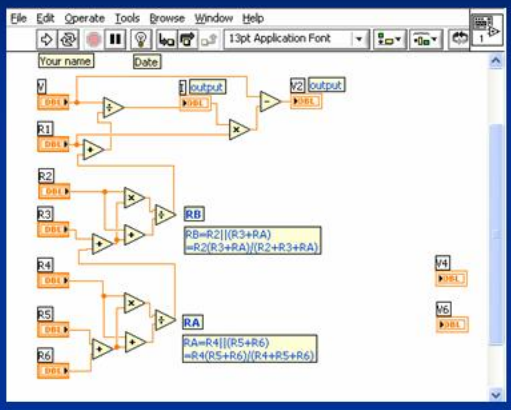
Step 2:



Step3:


File Edit Operate Tools Browse Window Help
13pt Application Font
Your name
Date
V
R1
R2
R3
R4
R5
R6
RB
RB=R2||(R3+RA)
=R2(R3+RA)/(R2+R3+RA)
RA
RA=R4||(R5+R6)
=R4(R5+R6)/(R4+R5+R6)
I
V2
V4
V6

Step 4:


File Edit Operate Tools Browse Window Help
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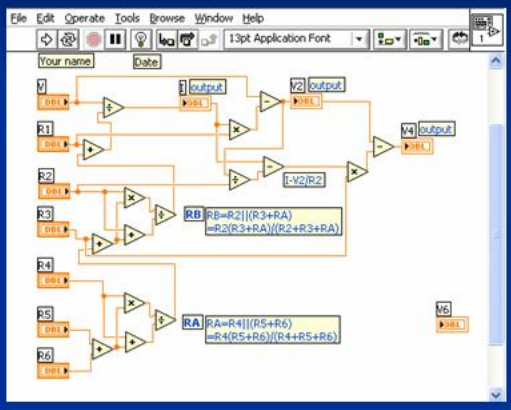
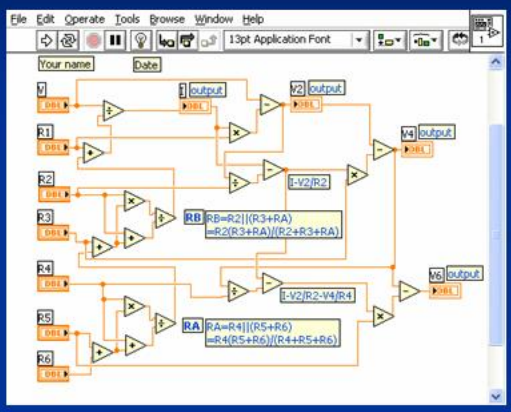
Your name
Date
V
R1
R2
R3
R4
R5
R6
I
output
V2
output
RB
RB=R2||(R3+RA)
=R2(R3+RA)/(R2+R3+RA)
RA
RA=R4||(R5+R6)
=R4(R5+R6)/(R4+R5+R6)
V4
V6

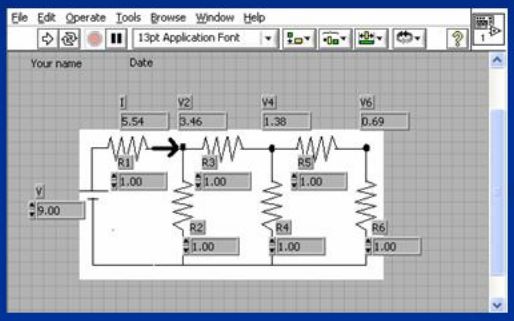
Step 5:

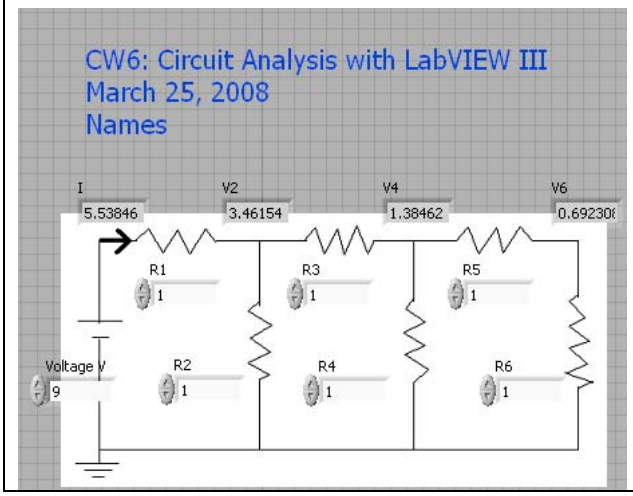

File Edit Operate Tools Browse Window Help
13pt Application Font
Your name
Date
V
R1
R2
R3
R4
R5
R6
I output
V2 output
V4 output
I-V2/R2
RB RB=R2||(R3+RA)
=R2(R3+RA)/(R2+R3+RA)
RA RA=R4||(R5+R6)
=R4(R5+R6)/(R4+R5+R6)
V6

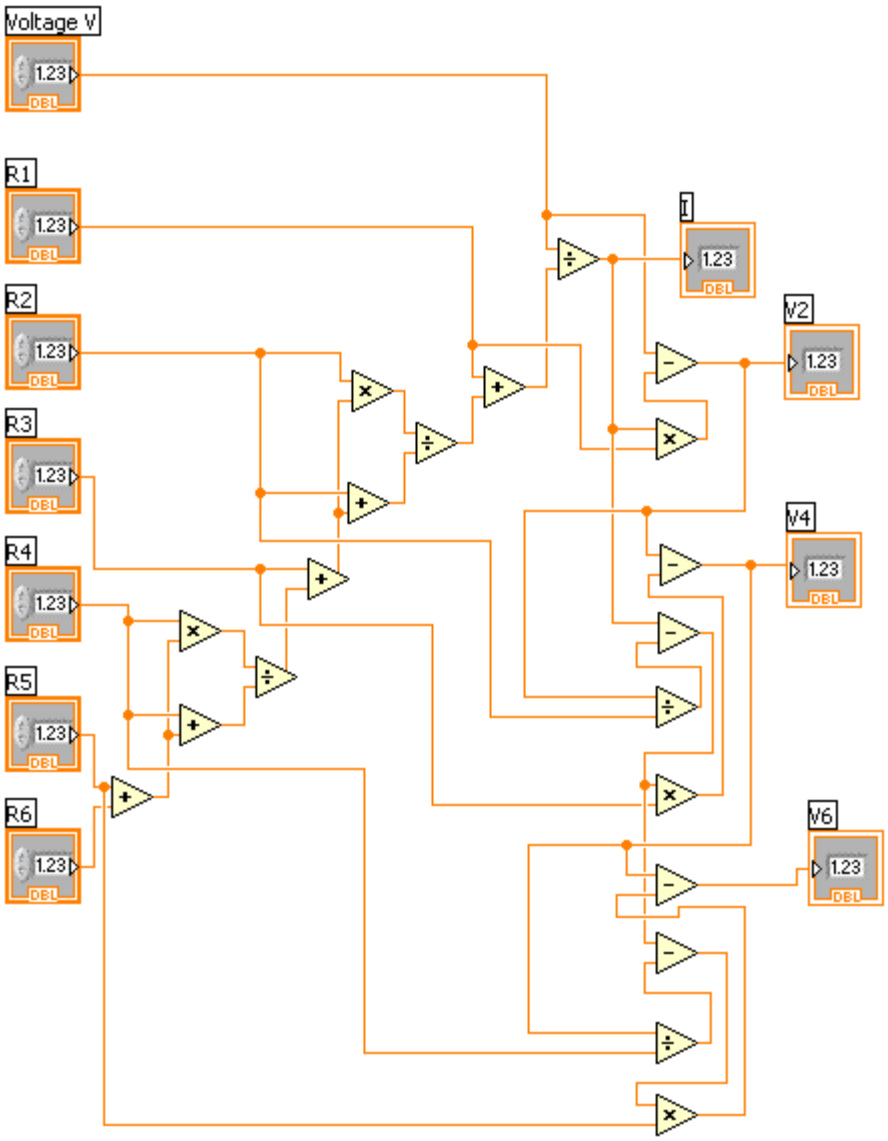
Step 6:


File Edit Operate Tools Browse Window Help
13pt Application Font
Your name
Date
V
R1
R2
R3
R4
R5
R6
I output
V2 output
V4 output
I-V2/R2
RB RB=R2||(R3+RA)
=R2(R3+RA)/(R2+R3+RA)
V6 output
I-V2/R2-V4/R4
RA RA=R4||(R5+R6)
=R4(R5+R6)/(R4+R5+R6)

Step 7: Check!


File Edit Operate Tools Browse Window Help
13pt Application Font
Your name
Date
I
5.54
V2
3.46
V4
1.38
V6
0.69
R1
1.00
R3
1.00
R5
1.00
V
9.00
R2
1.00
R4
1.00
R6
1.00


CW6: Circuit Analysis with LabVIEW III
March 25, 2008
Names
I
5.53846
V2
3.46154
V4
1.38462
V6
R1
1
R3
1
R5
1
Voltage V
9
R2
1
R4
1
R6
1



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LOGBOOK: example of a logbook page

-Use a quadrille notebook; number all pages; date all entries
-Write your notes for all activities, thoughts, problems and solutions, and learning conclusions related to Engin 103. You should write down progress, outcomes, and conclusions on projects and teamwork; conclusions from class work (including LabVIEW) and homework.

-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

29) Write in your logbook the equations to obtain I, V2, V4, and V6 from the Circuit Analysis with LaBVIEW III. Describe any similar groups of operations that are repeating in these equations.

30) Insert a copy of your Block Diagram for Circuit Analysis with LabVIEW III, circle the similar groups of operations you mentioned in the previous question. These groups of repeating operations will be replaced by a sub-VI in Circuit Analysis with LabVIEW IV. Answer this question when your VI for Circuit Analysis with LabVIEW III is completed.

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